ATD-2
Integrated Arrival/Departure/Surface

NASA

ATD-2 Perspective:
SWIFT Day 2 Introduction

May 22, 2019

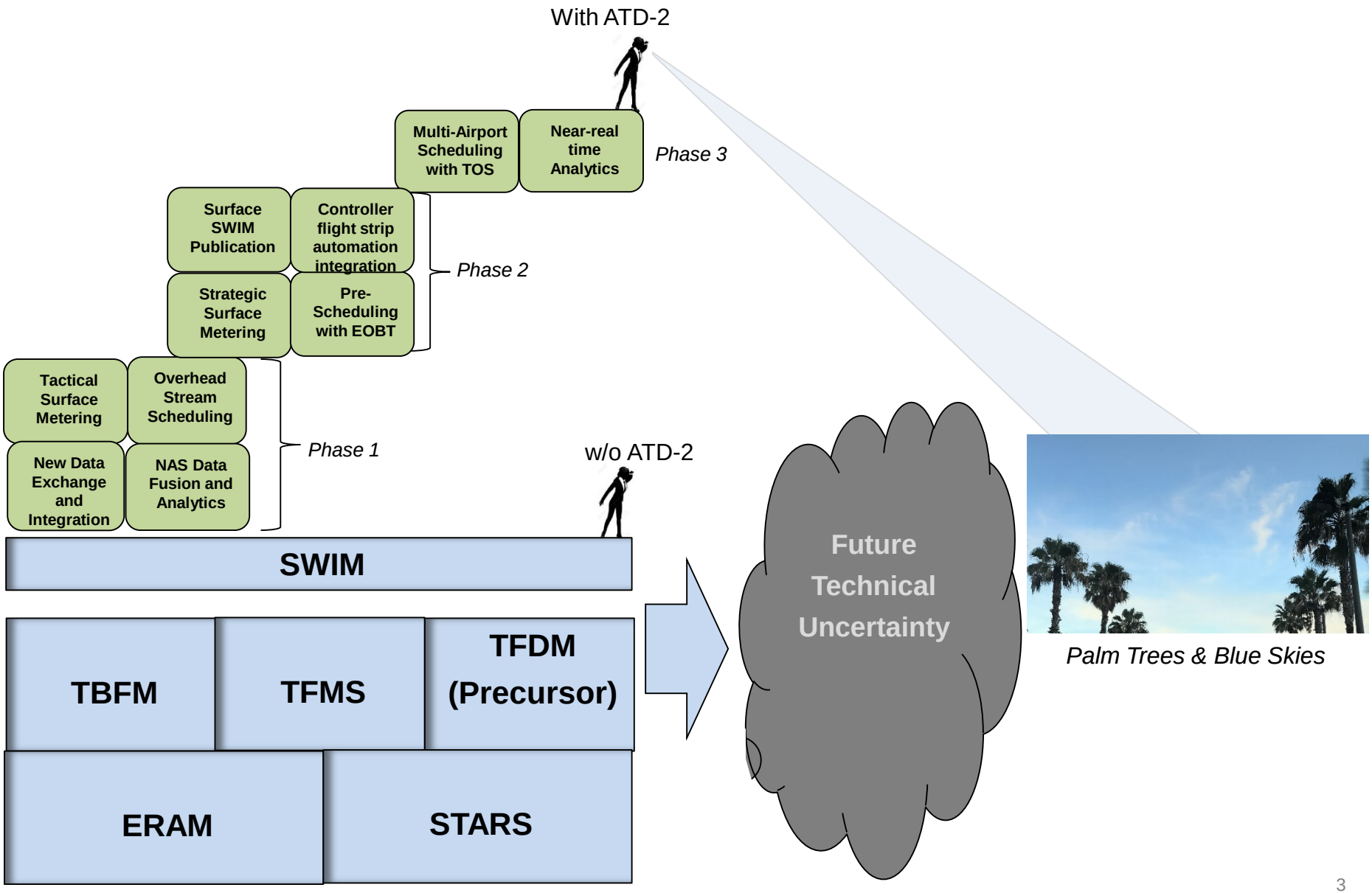
ATD-2 is a Prosumer of SWIM Data

- ATD-2 has greatly benefited from existing SWIM feeds
  - The project is powered by real-time SWIM data 

- ATD-2 consumes and utilizes the following SWIM feeds in real-time
  - (TFMS) Traffic Flow Management System - Flight & Flow data
  - (STDDS) SWIM Terminal Data Distribution System
  - (SFDPS) SWIM Flight Data Publication Service
  - (TBFM) Time Based Flow Management
  - (TFDM) Terminal Flight Data Management
  - (TAIS) Terminal Automation Information Service

- ATD-2 produces the following real-time SWIM feed on SWIM R&D
  - TFDM Terminal Publication (TTP)
  - This is in close coordination with the TFDM PO, using same JMSDD
  - The desire is to foster industry ***innovation*** in preparation for TFDM.

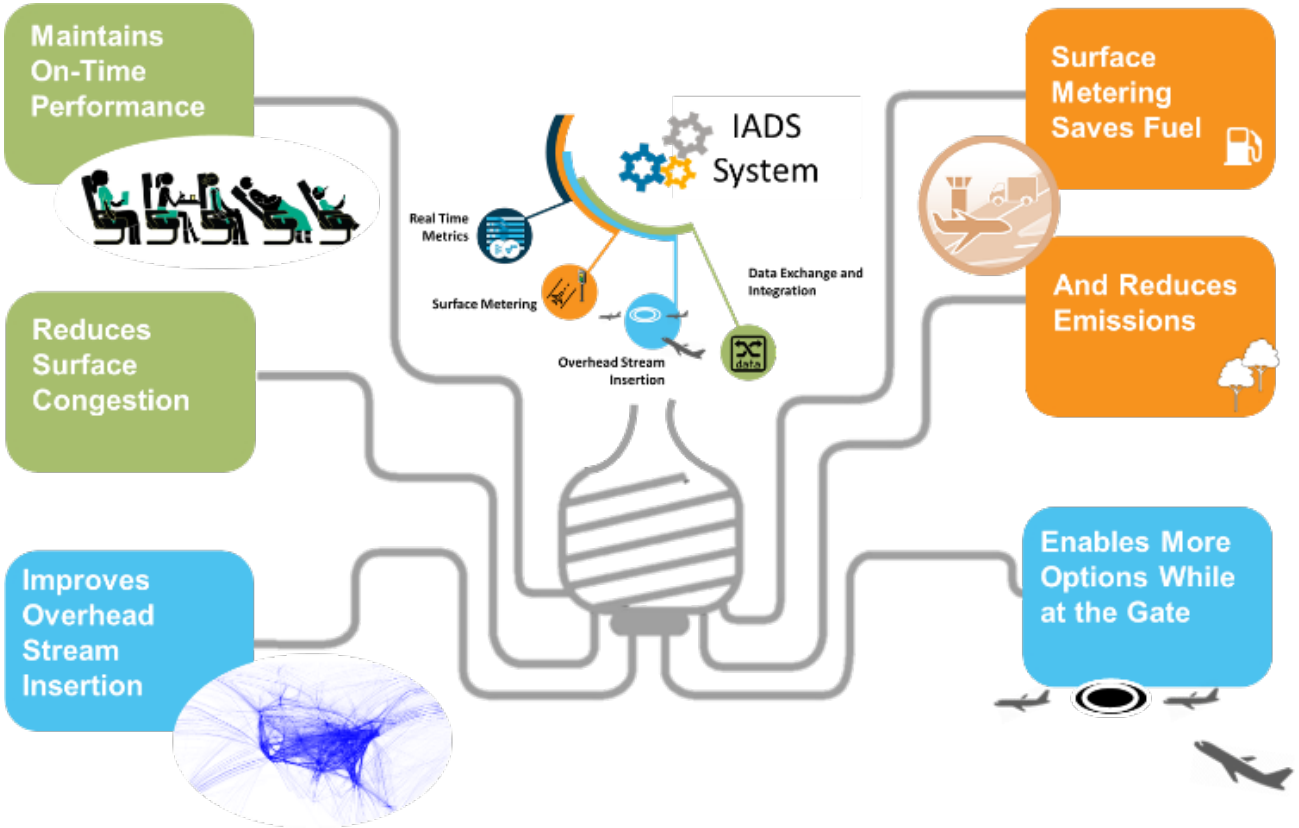
ATD-2 Provides a Unique Vantage Point into the Potential Future NAS



Palm Trees & Blue Skies

Demonstrating Benefits in the Field

- Multiple benefits mechanisms (benefits through 2019-05-06)
  - 2,295,383 lbs. of fuel saved
  - CO_2 savings equivalent to 82,226 urban trees
  - 270.7 hours of surface delay saved
    - $1,299,413 passenger value of time
    - $368,206 flight crew costs
  - 1,777 hours of reduced runtime on engines



Achieving Full Benefit from SWIM Flight Data

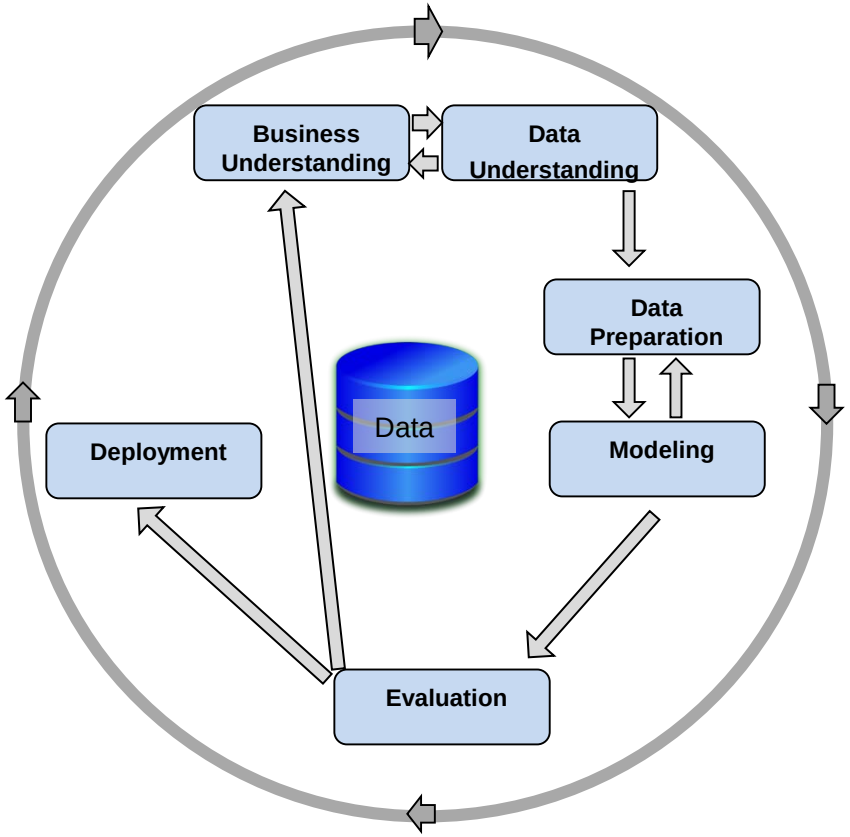
- Many people have worked hard to make SWIM data available (***Thank you***!)
  - Making the data available in a secure, stable platform was a major aviation engineering feat!

- Pre-processing & merging SWIM flight data feeds can be difficult, expensive and error prone
  - FAA decision support systems have valuable output data, but can provide inconsistent information on the same flight that is difficult for consumers to understand
  - Without deep knowledge of the underlying 3T (TFMS, TBFM, TFDM - plus ERAM and STARS) systems, the consumption logic may not lead toward the benefit the community desires
  - If everyone in the aviation industry creates their own SWIM flight data fusion process, many different organizations could come up with different definitions of the 'truth', degrading communication

- The ATD-2 mission required swift progress in field (operational) demonstrations
  - This led to a significant investment in logic that could address SWIM flight data pre-processing and mediation complexities. Much of this work is embodied in the 'Fuser' service.
  - Additional analytical investment was made in post-processing, which evolved over time through an ATD-2 internal data governance process with a feedback loop into the Fuser for more data

- ATD-2 desires to transfer this logic, lessons learned and software (if applicable)
  - After numerous conversations with Industry and FAA, this 'transfer' process is unclear
  - We welcome feedback from you to determine where any additional investments may be warranted
  - The goal is to create the basis for more advanced analytics, which builds upon mediated flight data

Data Mining Requires Agility



- The image above illustrates the Cross-industry standard process for data mining, known as ***CRISP-DM***. This is an open standard process model that describes common approaches used by data mining experts. It is likely the most widely-used analytics model.
- Experts in data mining widely recognize the iterative nature of this process, as well as the need for periodic engagement between business and technical contributors